

Radionuclide Regulations, Treatment and Affordability

*Anthony E. Bennett, R.S.
Texas Commission on
Environmental Quality
Water Supply Division*

Introduction

- **Rules Schedule**
- **Radionuclides**

Gross Alpha

Radium 226 and 228

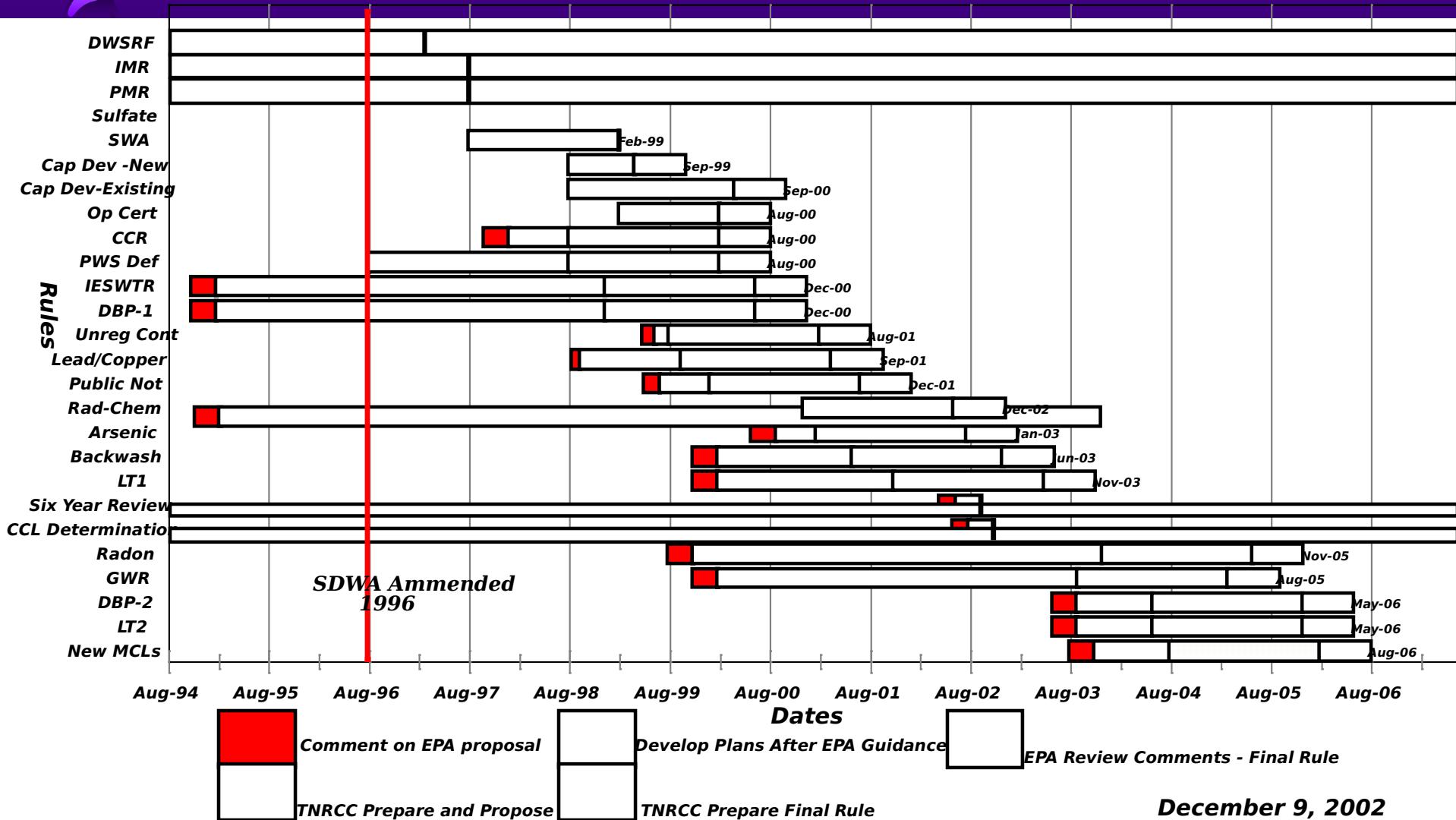
Uranium

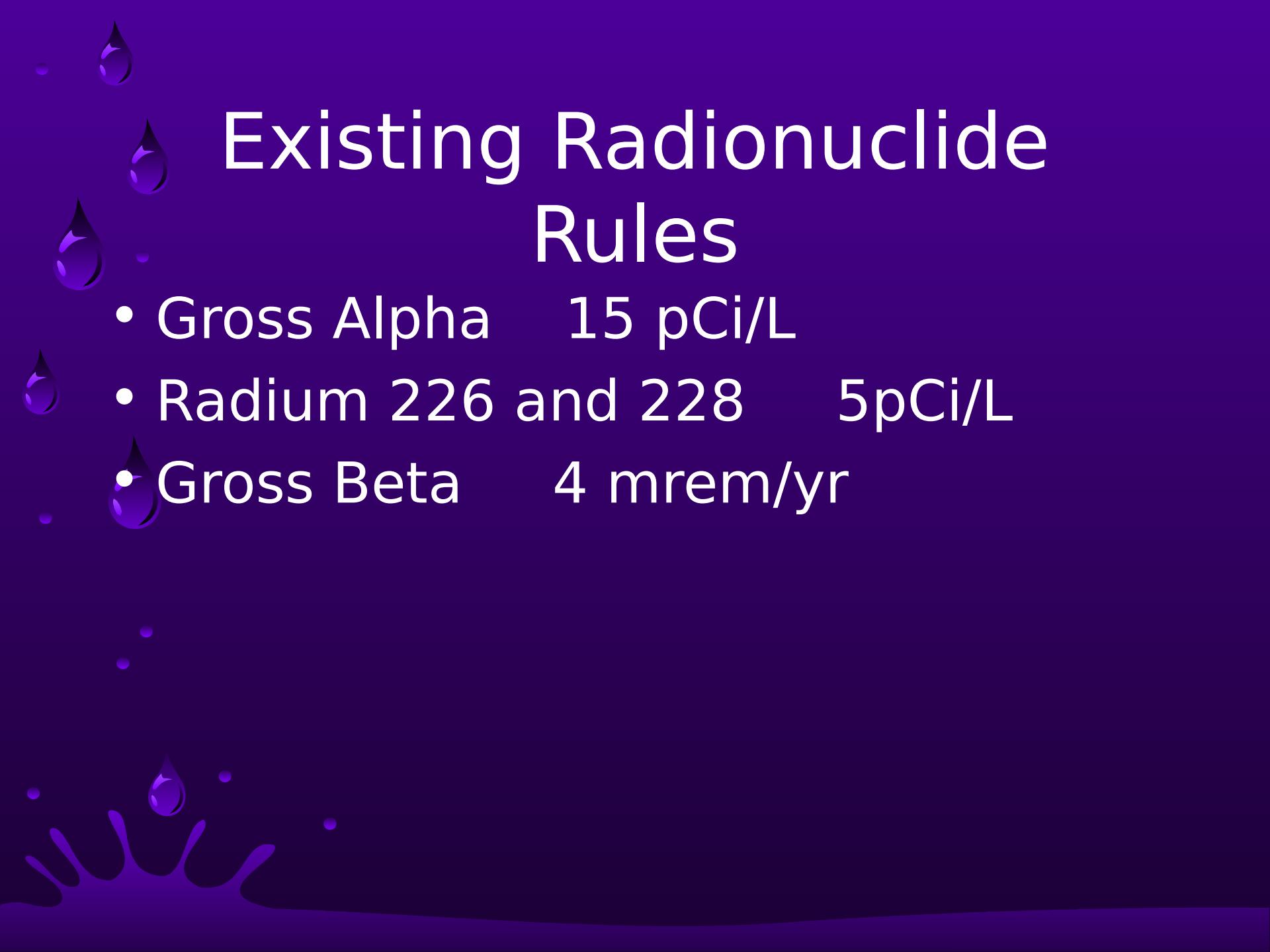
Gross Beta

- ***Treatment***
- ***Costs***

Rules Adoption

Public Water System Rule Schedule EPA Initiated Rules





Existing Radionuclide Rules

- Gross Alpha 15 pCi/L
- Radium 226 and 228 5pCi/L
- Gross Beta 4 mrem/yr

Radionuclides

(except Radon)

- **EPA published NODA on April 21, 2000**

- **Maintain current 5 pCi/L for Ra 226/228**

- **Maintain current 15 pCi/L for Gross Alpha**

- **Three options for Uranium MCL at 20, 40 and 80 pCi/L**

- **December 7, 2000 final regs on radium, uranium,**

Radionuclides Schedule

- **TCEQ Propose Rules**

May 2004

- **TCEQ Final Rules**

December 2004

- **Federal Effective Date**

December 2003

- **TCEQ Effective Date**

January 2004

Proposed Radionuclide MCLs

- ***Gross Alpha***

- 15 pCi/l - 94 violations***

- ***Radium 226 & 228***

- 5 pCi/l - 94 violations***

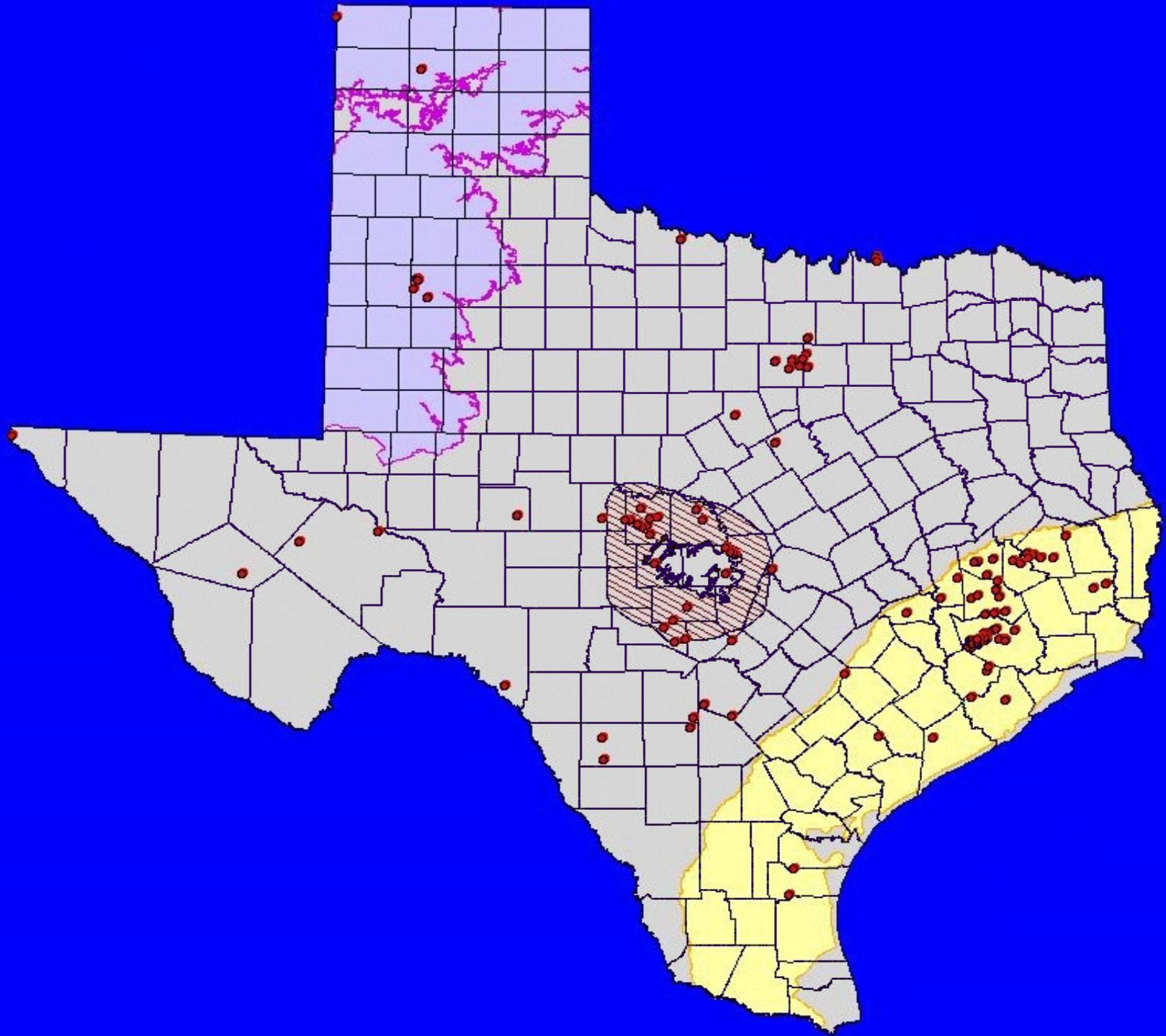
- ***Uranium***

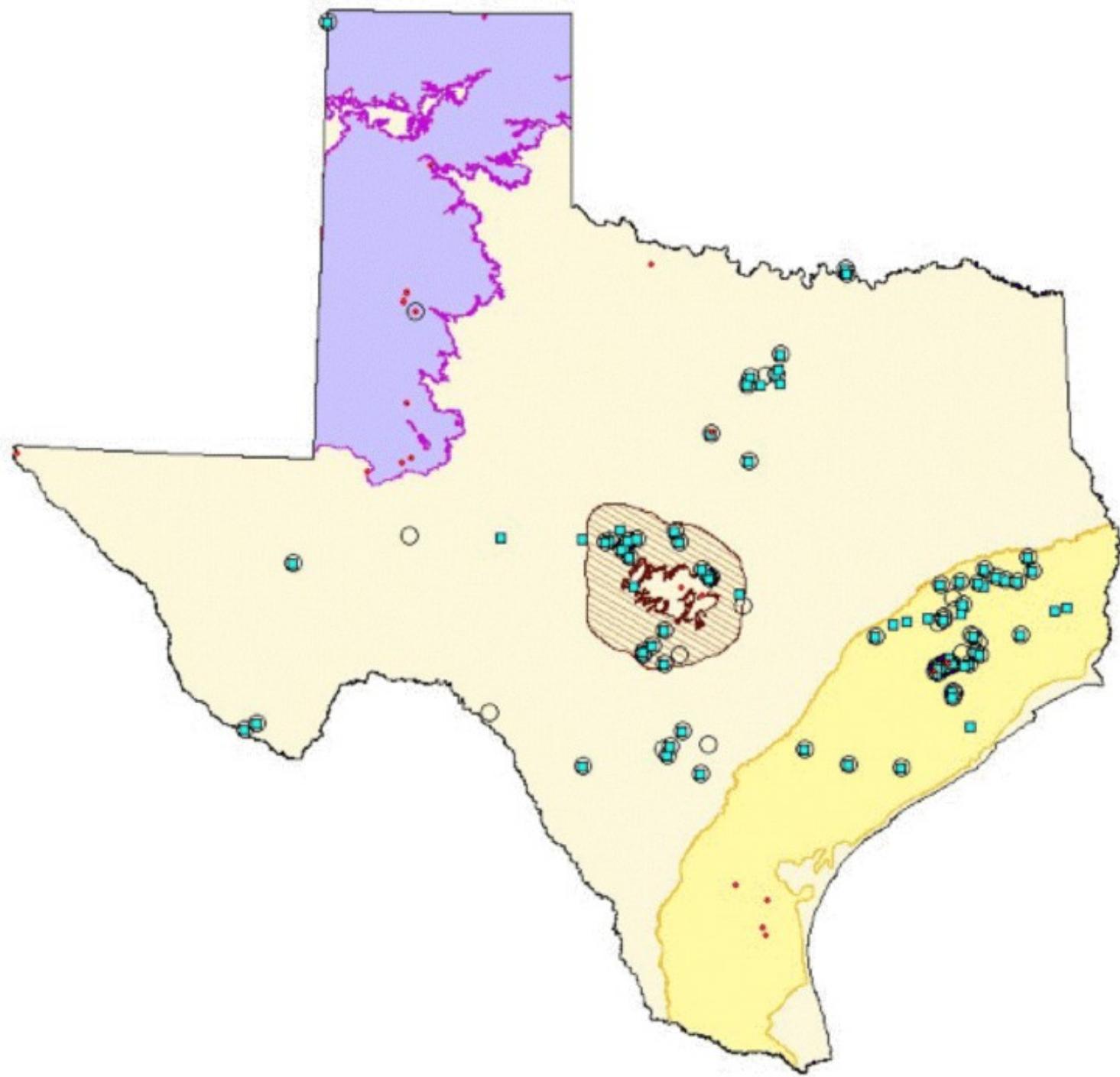
- 30 pCi/l - 23 violations***

- ***Radon***

- 300 pCi/l - 850 violations***

- 4000 pCi/l - 50 Violations***





Compliance Options

- **New/Different Water Source**
- **Managing Existing Sources**
- **Developing New Sources**
- **Purchasing water**
- **Treatment**

Treatment for Radionuclides

- *Demineralization*
 - *Ion Exchange*
 - *Lime Softening*

Demineralization

- **Membrane process that removes a percent of most soluble inorganics**
- **Produces a “Reject” stream of concentrated contaminants**

Ion Exchange

- *Resin adsorption process which exchanges one cation for another*
 - *Produces a “Regeneration” stream of high levels of salt and concentrated contaminants*

Lime Softening

- *High pH precipitation and removal process*
 - *Produces a “Lime Sludge” which includes concentrated contaminants*



No Discharge Contaminant Specific Resins

- ***Essentially an Ion Exchange process which has a long life***
- ***Produces no onsite discharge or waste***
- ***Resin is removed when “spent” and replaced with***

Residuals Management

Can

- **Discharge to environment**
- **Must meet effluent standards (60/60/300)**
- **Discharge to Sewage Collection System**

System

- **Must meet effluent standards (600/600/3000)**
- **Non Commercial Class I injection well**

Can't

- **Residuals above effluent standards**

Residuals Management

- *Solid Residuals*
- *Can*
 - *Out of State Licensed NORM Facility*
- *Can't*
 - *In State NORM Waste Facility*
 - *In State Class I NORM injection well*

Treatment Costs

- *Capital Costs*
- *Operation and Maintenance Costs*
- *Residuals Management Costs*

Treatment Costs

- **Surveyed Water systems or applied models**

- **Cost Range (Per Connection)**

\$1 per month for managing existing sources

\$140 per month for small water system RO treatment

- **New Treatment Technologies in the range of \$10 to \$25 per month per Connection**

Conclusions

- **Radionuclides are naturally occurring in Parts of Texas**
- **Radionuclide regulations have recently been revised**
- **New Regulations will create more violations**
- **Several Compliance Options**
- **Treatment options Limited by residuals management options and costs**